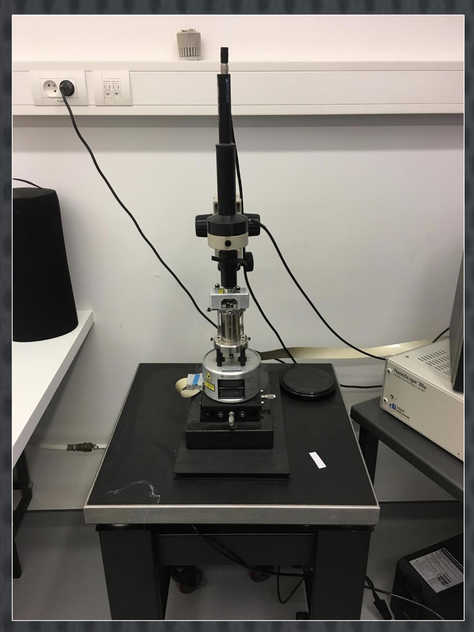
Magnetic observation of micro and nanostructures

E. Fourneau[1] , S. Blanco Alvarez[2]
[1]Solid State Physics – Interfaces and Nanostructures, Q-MAT, CESAM, Université de Liège, B-4000 Sart-Tilman, Belgium
[2]Experimental Physics of Nanostructured Materials, Q-MAT, CESAM, Université de Liège, B-4000 Sart-Tilman, Belgium

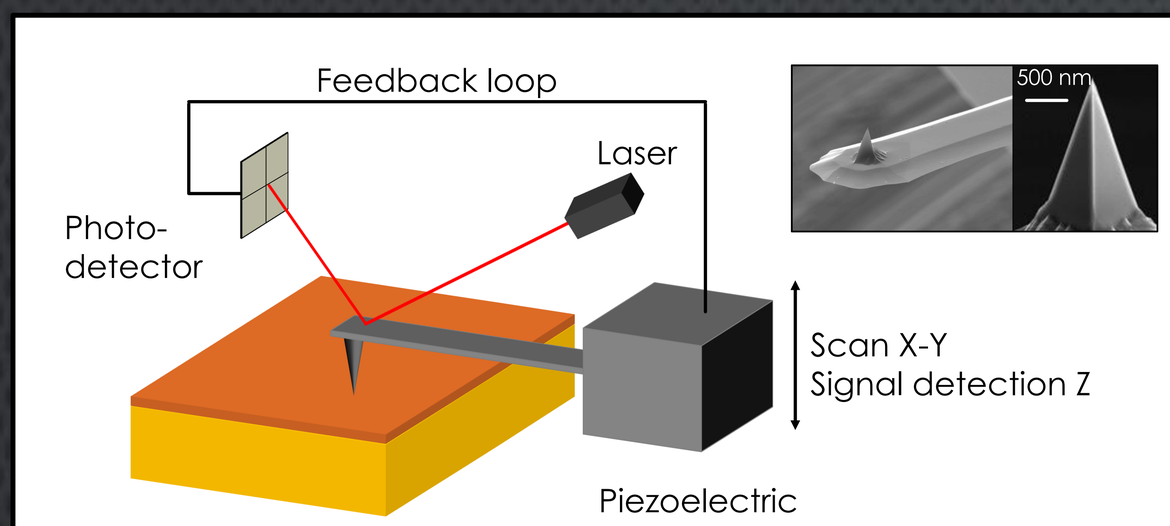
Magnetic Force Microscopy (MFM)

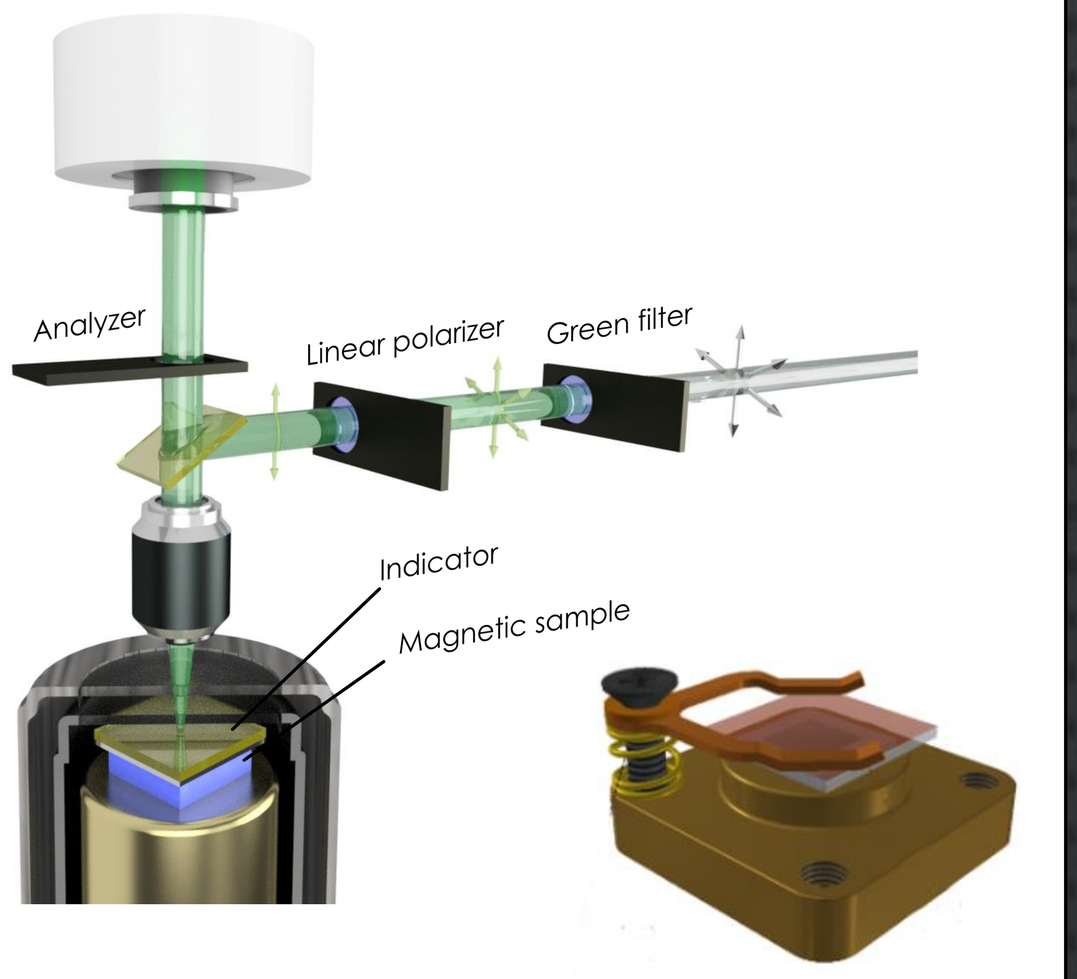
Magnetic force Microscopy is a variant of Atomic Force Microscopy (AFM) used to study the surface of materials with magnetic properties. MFM monitors the force between a magnetic tiny tip (extremity of several nm) and the stray fields present on the surface of the sample. With a resolution similar to the tip radius, MFM allows the visualization of magnetic domains.

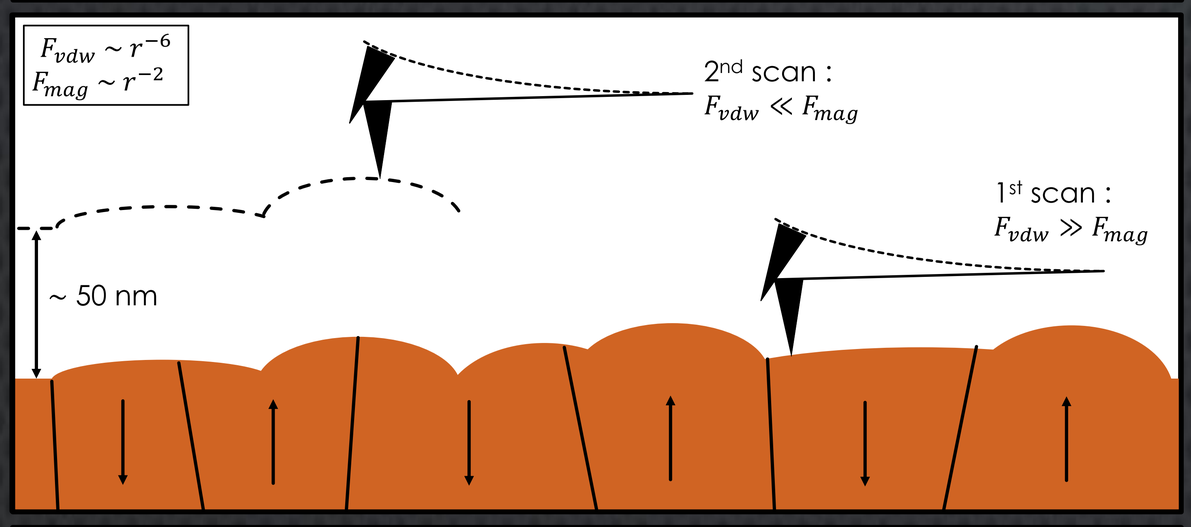


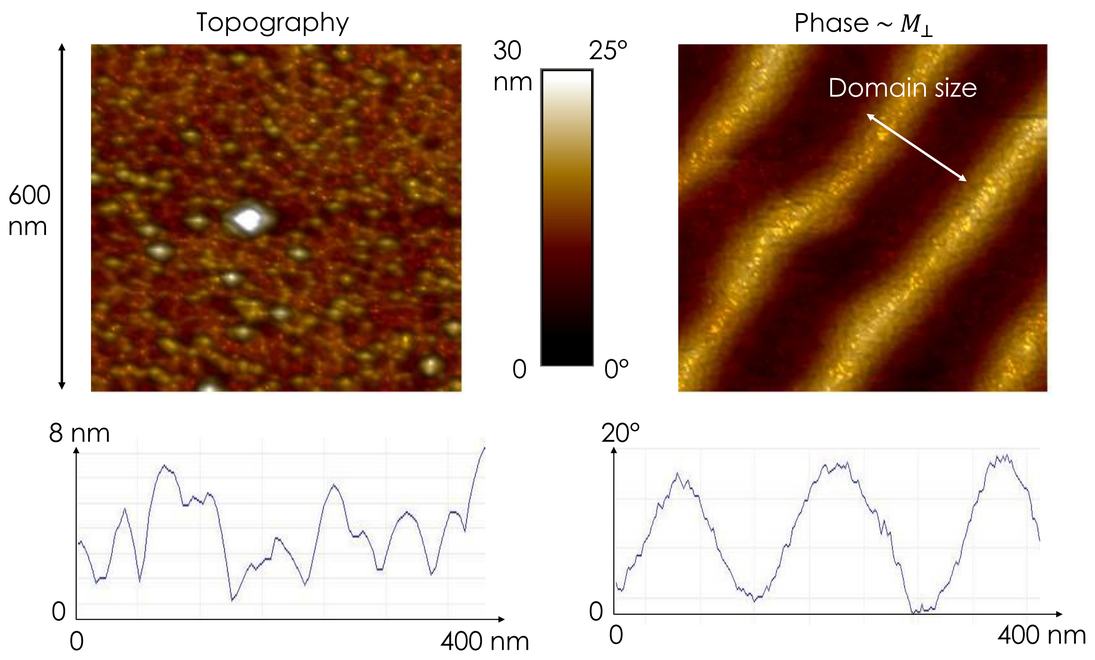
Magneto-Optical Imaging (MOI)

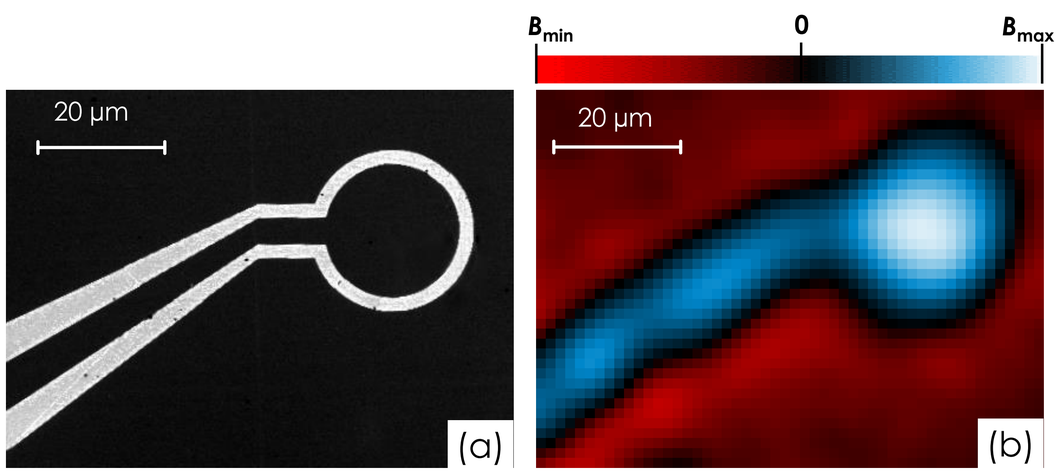
Magneto optical imaging allows visualization of the magnetic stray field produced by flat samples. The technique uses an indicator with high faraday effect, changing the polarization of a light beam proportionally to the local magnetic field.







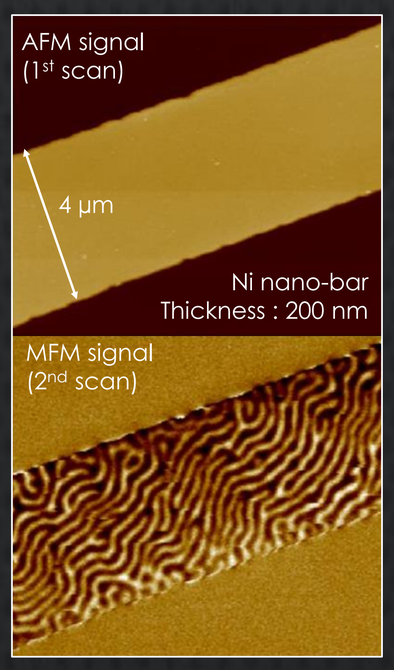




Micrometric single turn Aluminium coil. (a) SEM observation of the single turn coil (b) Room temperature Magneto optical observation of the magnetic field generated by the single turn coil with 50mA applied to it.

Characteristics :

- **Field of view: 10 µm × 10 µm**
- **Resolution : less than 25 nm × 25 nm**
- **Acquisition time: ~ 1-5 min**
- **Sensitivity (∇F_{mag}): ~1 µN/m**
- **Tip coercivity: Hard (125 Oe) or Low (0.75 Oe)**
- **Operating temperature: RT**



Characteristics :

- **Field of view: 3 mm × 3 mm**
- **Resolution : 1,618 µm × 1,618 µm**
- **Acquisition time: ~ 0.5 s**
- **Sensitivity: 10 µT**
- **Applied magnetic field: -5 mT → 5 mT**
- **Operating temperature: 4 K → 120 K**

Scan me for live MOI!